

PRINTED IN CHINA / IMPRIMÉ EN CHINE
00KUP (TINSK0416THZZ)

INTRODUCTION

About operation examples, please refer to the attached sheet.
Refer to the number on the right of each title for use.
After reading this manual, store it in a convenient location for future reference.

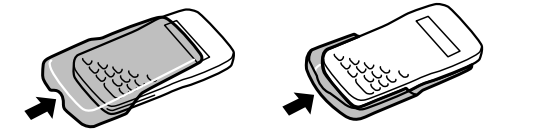
Operational Notes

To ensure trouble-free operation, please observe the following points:

- Do not carry the calculator in the back pocket of slacks or trousers.
- Do not subject the calculator to extreme temperatures.
- Do not drop it or apply excessive force.
- Clean only with a soft, dry cloth.
- Do not use or store the calculator where fluids can splash onto it.

If service should be required on this calculator, use only a SHARP servicing dealer, SHARP approved service facility, or SHARP repair service where available.

Hard Case



DISPLAY

Floating point system

2ndF HYP DEG RAD GRAD () BIN OCT HEX CPLX STAT

M-1234567890

←Symbol

Scientific notation system

2ndF HYP DEG RAD GRAD () BIN OCT HEX CPLX STAT

M12345678-99

Mantissa

Exponent

(During actual use not all symbols are displayed at the same time.)
If the value of mantissa does not fit within the range ±0.000000001 – ±9999999999, the display changes to scientific notation. The display mode can be changed according to the purpose of the calculation.

2ndF : Appears when **[2ndF]** is pressed, indicating that the functions shown in orange are enabled.

HYP : Indicates that **[hyp]** has been pressed and the hyperbolic functions are enabled. If **[2ndF] [arc hyp]** are pressed, the symbols **“2ndF HYP”** appear, indicating that inverse hyperbolic functions are enabled.

DEG/RAD/GRAD: Indicates angular units and changes each time **[DRG]** is pressed. The default setting is DEG.

() : Appears when a calculation with parentheses is performed by pressing **[(]**.

BIN : Indicates that **[2ndF] [BIN]** has been pressed. Binary system mode is selected.

OCT : Indicates that **[2ndF] [OCT]** has been pressed. Octal system mode is selected.

HEX : Indicates that **[2ndF] [HEX]** has been pressed. Hexadecimal system mode is selected.

CPLX : Indicates that **[2ndF] [CPLX]** has been pressed. Complex number mode is selected.

STAT : Indicates that **[2ndF] [STAT]** has been pressed. Statistics mode is selected.

M : Indicates that a numerical value is stored in the independent memory.

E : Appears when an error is detected.

BEFORE USING THE CALCULATOR

Key Notation Used in this Manual
In this manual, key operations are described as follows:

- To specify A (HEX) : A
- To specify π : **[2ndF] [π]**
- To specify Exp : **[Exp]**

Functions that are printed in orange above the key require **[2ndF]** to be pressed first before the key. Numbers are not shown as keys, but as ordinary numbers.

Power On and Off

Press **[ON/C]** to turn the calculator on, and **[OFF]** to turn it off.

Clearing Methods

- Press **[ON/C]** to clear the entries except for a numerical value in the independent memory and statistical data.
- Press **[CE]** to clear the number entered prior to use of function key.
- In case of one digit correction of the entered number, press **[→]** (right shift key).

Priority Levels in Calculation

This calculator performs operations according to the following priority:

- Functions such as sin, x², and %
 - y^x, √y
 - ×, +
 - +, −
 - =, M+ and other calculation ending instruction
- Calculations which are given the same priority level are executed in sequence.
 - If parentheses are used, parenthesized calculations have precedence over any other calculations.
 - Parentheses can be continuously used up to 15 times unless pending calculations exceed 4.

INITIAL SETUP

Mode Selection

Normal mode: **[ON/C]**
Used to perform arithmetic operations and function calculations. **BIN, OCT, HEX, CPLX** and **STAT** are not displayed.

Binary, Octal, Decimal, or Hexadecimal system mode:
[2ndF] [BIN], **[2ndF] [OCT]**, **[2ndF] [DEC]** or **[2ndF] [HEX]**

Complex number mode: **[2ndF] [CPLX]**
Used to perform arithmetic operations with complex numbers. To clear this mode, press **[2ndF] [CPLX]**.

Statistics mode: **[2ndF] [STAT]**
Used to perform statistical calculations. To clear this mode, press **[2ndF] [STAT]**.
When executing mode selection, statistical data will be cleared even when reselecting the same mode.

Selecting the Display Notation and Decimal Places

When calculation result is displayed in the floating point system, pressing **[F↔E]** displays the result in the scientific notation system.
Pressing **[F↔E]** once more displays the result again in the floating point system.

Pressing **[2ndF] [TAB]** and any value between 0 and 9 specifies the number of decimal places in the calculation result. To clear the setting of decimal places, press **[2ndF] [TAB] [.]**.

100000÷3=

[Floating point]

[ON/C] 100000 **[÷]** 3 **[=]**

33333.33333

[TAB set to 2]

[2ndF] [TAB] 2

33333.33

→[Scientific notation]

[F↔E]

3.33 04

→[Floating point]

[F↔E] [2ndF] [TAB] [.]

33333.33333

- If the value for floating point system does not fit in the following range, the calculator will display the result using scientific notation system:
0.000000001 ≤ | x | ≤ 9999999999

Determination of the Angular Unit
In this calculator, the following three angular units can be specified.



SCIENTIFIC CALCULATIONS

- Calculate in the normal mode.
- In each example, press **[ON/C]** to clear the display.

Arithmetic Operations (1)
• The closing parenthesis **[)]** just before **[=]** or **[M+]** may be omitted.
• When entering only a decimal place, it is not necessary to press **[0]** before **[.]**.

Constant Calculations (2)
• In the constant calculations, the addend becomes a constant. Subtraction and division are performed in the same manner. For multiplication, the multiplicand becomes a constant.

Functions (3)
• Refer to operation examples of each function.
• For most calculations using functions, enter numerical values before pressing the function key.
• The results of inverse trigonometric functions are displayed within the following range:

	$\theta = \sin^{-1} x, \theta = \tan^{-1} x$	$\theta = \cos^{-1} x$
DEG	$-90 \leq \theta \leq 90$	$0 \leq \theta \leq 180$
RAD	$-\frac{\pi}{2} \leq \theta \leq \frac{\pi}{2}$	$0 \leq \theta \leq \pi$
GRAD	$-100 \leq \theta \leq 100$	$0 \leq \theta \leq 200$

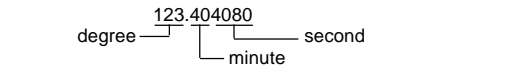
Random Numbers
A pseudo-random number with three significant digits can be generated by pressing **[2ndF] [RANDOM]**. Random number generation is not possible when binary/octal/hexadecimal system mode is set.

Angular Unit Conversions (4)
Each time **[2ndF] [DRG]** are pressed, the angular unit changes in sequence.

Memory Calculations (5)
This calculator has one independent memory. It is available in the normal mode and binary, octal, hexadecimal system mode.
• The independent memory is indicated by the three keys: **[STO]**, **[RCL]**, **[M+]**.
Before starting a calculation, clear the memory by pressing **[ON/C]** and **[STO]**.
• A value can be added to or subtracted from an existing memory value. When subtracting a number from the memory, press **[+/-]** and **[M+]**.
• The contents of the memory are retained even when the calculator is turned off. A value stored in memory will thus remain until it is changed or until the batteries run out.

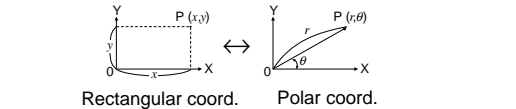
Chain Calculations (6)
This calculator allows the previous calculation result to be used in the following calculation.
The previous calculation result will not be recalled after entering multiple instructions.

Time, Decimal and Sexagesimal Calculations (7)
This calculator performs decimal-to-sexagesimal conversion and sexagesimal-to-decimal conversion. In addition, the four basic arithmetic operations and memory calculations can be carried out using the sexagesimal system.
Notation for sexagesimal is as follows:



Note: When the calculation or conversion result is converted, a residual may occur.

Coordinate Conversions (8)
• Before performing a calculation, select the angular unit.



BINARY, OCTAL, DECIMAL, AND HEXADECIMAL OPERATIONS (N-BASE) (9)

This calculator can perform the four basic arithmetic operations, calculations with parentheses and memory calculations using binary, octal, decimal, and hexadecimal numbers.
When performing calculations in each system, first set the calculator in the desired mode before entering numbers.
It can also perform conversions between numbers expressed in binary, octal, decimal and hexadecimal systems.
Conversion to each system is performed by the following keys:

- [2ndF] [BIN]** : Converts to the binary system. “BIN” appears.
- [2ndF] [OCT]** : Converts to the octal system. “OCT” appears.
- [2ndF] [HEX]** : Converts to the hexadecimal system. “HEX” appears.
- [2ndF] [DEC]** : Converts to the decimal system. “BIN”, “OCT”, and “HEX” disappear from the display.

Conversion is performed on the displayed value when these keys are pressed.

Note: In this calculator, the hexadecimal numbers A – F are entered by pressing **[A Exp]**, **[B y^x]**, **[C √x]**, **[D DEG]**, **[E ln]**, and **[F log]**, and displayed as follows:

$A \rightarrow \bar{A}, B \rightarrow \bar{b}, C \rightarrow \bar{c}, D \rightarrow \bar{d}, E \rightarrow \bar{e}, F \rightarrow \bar{f}$

In the binary, octal, and hexadecimal systems, fractional parts cannot be entered. When a decimal number having a fractional part is converted into a binary, octal, or hexadecimal number, the fractional part will be truncated. Likewise, when the result of a binary, octal, or hexadecimal calculation includes a fractional part, the fractional part will be truncated. In the binary, octal, and hexadecimal systems, negative numbers are displayed as a complement.

COMPLEX NUMBER CALCULATIONS (10)

To carry out addition, subtraction, multiplication, and division using complex numbers, press **[2ndF] [CPLX]** to select the complex number mode.
• A complex number is represented in the a + bi format. The “a” is the real part while the “bi” is the imaginary part. When inputting the real part, after inputting the number press **[a]**. When inputting the imaginary part, after inputting the number press **[b]**. To obtain the result press **[=]**.
• Immediately after completing calculation, you can recall the value of the real part with **[a]**, and the value of the imaginary part with **[b]**.
• If the complex numbers are represented as polar coordinates, press **[2ndF] [→xy]** after they are input with **[a]** and **[b]**.

STATISTICAL CALCULATIONS (11)

Press **[2ndF] [STAT]** to select statistics mode.
The following statistics can be obtained:

\bar{x}	Mean of samples (x data)
sx	Sample standard deviation (x data)
σx	Population standard deviation (x data)
n	Number of samples
Σx	Sum of samples (x data)
Σx^2	Sum of squares of samples (x data)

Entered data are kept in memory until **[2ndF] [STAT]** or **[OFF]** are pressed. Before entering new data, clear the memory contents.

[Data Entry]
Data **[DATA]**
Data **[X]** *frequency* **[DATA]** (To enter multiples of the same data)

[Data Correction]
Correction prior to pressing **[DATA]**:
Delete incorrect data with **[ON/C]**.
Correction after pressing **[DATA]**:
Press **[2ndF] [CD]** to delete the latest entry.

Statistical Calculation Formulas

$$\bar{x} = \frac{\Sigma x}{n}$$
$$sx = \sqrt{\frac{\Sigma x^2 - n\bar{x}^2}{n-1}}$$

$$\sigma x = \sqrt{\frac{\Sigma x^2 - n\bar{x}^2}{n}}$$
$$\Sigma x = x_1 + x_2 + \dots + x_n$$
$$\Sigma x^2 = x_1^2 + x_2^2 + \dots + x_n^2$$

(n: Number of samples)

In the statistical calculation formulas, an error will occur when:

- the absolute value of the intermediate result or calculation result is equal to or greater than 1×10^{100} .
- the denominator is zero.
- an attempt is made to take the square root of a negative number.

ERROR AND CALCULATION RANGES

Errors
An error will occur if an operation exceeds the calculation ranges, or if a mathematically illegal operation is attempted. In the case of an error, the display will show “E”.
An error can be cleared by pressing **[ON/C]**.

Calculation Ranges

- Within the ranges specified below, this calculator is accurate to ±1 in the least significant digit of the mantissa. When performing continuous calculations (including chain calculations), errors accumulate leading to reduced accuracy.
- Calculation ranges
±10⁻⁹⁹ ~ ±9.999999999×10⁹⁹ and 0.
If the absolute value of an entry or a final or intermediate result of a calculation is less than 10⁻⁹⁹, the value is considered to be 0 in calculations and in the display.

Function	Dynamic range
	DEG: $ x \leq 4.499999999 \times 10^{10}$ (tan x : $ x \neq 90$ (2n-1))° RAD: $ x \leq 785398163.3$ (tan x : $ x \neq \frac{\pi}{2}$ (2n-1))° GRAD: $ x \leq 4.999999999 \times 10^{10}$ (tan x : $ x \neq 100$ (2n-1))°
cos x	DEG: $ x \leq 4.500000008 \times 10^{10}$ RAD: $ x \leq 785398164.9$ GRAD: $ x \leq 5.000000009 \times 10^{10}$
sin ⁻¹ x, cos ⁻¹ x	$ x \leq 1$
tan ⁻¹ x, √x	$ x < 10^{100}$
ln x, log x	10 ⁻⁹⁹ ≤ x < 10 ¹⁰⁰
e ^x	-10 ¹⁰⁰ < x ≤ 230.2585092
10 ^x	-10 ¹⁰⁰ < x < 100
sinh x, cosh x	$ x \leq 230.2585092$
tanh x	$ x < 10^{100}$
sinh ⁻¹ x	$ x < 5 \times 10^{99}$

Function	Dynamic range
cosh ⁻¹ x	$1 \leq x < 5 \times 10^{99}$
tanh ⁻¹ x	$ x < 1$
x²	$ x < 10^{90}$
√x	$0 \leq x < 10^{100}$
1/x	$ x < 10^{100}$ (x ≠ 0)
n!	0 ≤ n ≤ 69*
→D.MS →DEG	$ x < 1 \times 10^{100}$
x, y → r, θ	$ x , y < 10^{90}$ $ \frac{y}{x} , x^2 + y^2 < 10^{100}$
r, θ → x, y	$0 \leq r < 10^{100}$ DEG: $ \theta < 4.5 \times 10^{10}$ RAD: $ \theta \leq 785398163.3$ GRAD: $ \theta < 5 \times 10^{10}$
DRG ►	DEG→RAD, GRAD→DEG: $ x < 10^{100}$ RAD→GRAD: $ x < \frac{\pi}{2} \times 10^{98}$
y ^x	• y > 0: -10 ¹⁰⁰ < x ln y ≤ 230.2585092 • y = 0: 0 < x < 10 ¹⁰⁰ • y < 0: x = n (0 < x < 1 : $\frac{1}{x} = 2n-1, x \neq 0$)*, -10 ¹⁰⁰ < x n y ≤ 230.2585092
x√y	• y > 0: -10 ¹⁰⁰ < $\frac{1}{x}$ ln y ≤ 230.2585092 (x ≠ 0) • y = 0: 0 < x < 10 ¹⁰⁰ • y < 0: x = 2n-1 (0 < x < 1 : $\frac{1}{x} = n, x \neq 0$)*, -10 ¹⁰⁰ < $\frac{1}{x}$ ln y ≤ 230.2585092
(A+B)÷(C+D) (A+B)–(C+D)	A ± C < 10 ¹⁰⁰ B ± D < 10 ¹⁰⁰
(A+B)×(C+D)	(AC – BD) < 10 ¹⁰⁰ (AD + BC) < 10 ¹⁰⁰
(A+B)÷(C+D)	$\frac{AC + BD}{C^2 + D^2} < 10^{100}$ $\frac{BC - AD}{C^2 + D^2} < 10^{100}$ C² + D² ≠ 0
→DEC →BIN →OCT →HEX	DEC : $ x \leq 9999999999$ BIN : $1000000000 \leq x \leq 1111111111$ 0 ≤ x ≤ 1111111111 OCT : $4000000000 \leq x \leq 7777777777$ 0 ≤ x ≤ 3777777777 HEX : FDABF41C01 ≤ x ≤ FFFFFFFF 0 ≤ x ≤ 2540BE3FF

* (n: integer)

BATTERY REPLACEMENT

Notes on Battery Replacement
Improper handling of batteries can cause electrolyte leakage or explosion. Be sure to observe the following handling rules:

- Replace both batteries at the same time.
- Do not mix new and old batteries.
- Make sure the new batteries are the correct type (LR44).
- When installing, orient each battery properly as indicated in the calculator.
- Batteries are factory-installed before shipment, and may be exhausted before they reach the service life stated in the specifications.

When to Replace the Batteries
If the display has poor contrast, the batteries require replacement.

Caution

- Keep batteries out of the reach of children.
- Exhausted batteries left in the calculator may leak and damage the calculator.
- Explosion risk may be caused by incorrect handling.
- Batteries must be replaced only with others of the same type.
- Do not throw batteries into a fire as they may explode.

Replacement Procedure

- Turn the power off by pressing **[OFF]**.
- Loosen both screws and remove the battery cover. (Fig. 1)



- Remove the used batteries then replace with two fresh batteries with the positive sides (+) facing up. (Fig. 2)
- Replace the battery cover and screws.
- Press **[ON/C]**.
- Make sure that the display appears as shown below. If the display does not appear as shown, reinstall the batteries and check the display once again.



Automatic Power Off Function
This calculator will turn itself off to save battery power if no key is pressed for approximately 8 minutes.

SPECIFICATIONS

Calculations:	Scientific calculations, binary/octal/hexadecimal number calculations, complex number calculations, statistical calculations, etc.
Internal calculations:	Mantissas of up to 10 digits
Pending operations:	4 calculations
Power source:	3V \times (DC): Alkaline batteries (LR44) \times 2
Power consumption:	0.0005 W
Operating time:	Approx. 3000 hours when continuously displaying 55555. at 25°C (77°F). Varies according to use and other factors.
Operating temperature:	0°C – 40°C (32°F – 104°F)
External dimensions:	78.6 mm (W) \times 144 mm (D) \times 10.5 mm (H) 3-3/32" (W) \times 5-21/32" (D) \times 13/32" (H)
Weight:	Approx. 68 g 0.150 lb (Including batteries)
Accessories:	Batteries \times 2 (installed), operation manual, operation examples sheet, quick reference card and hard case

FOR MORE INFORMATION ABOUT THIS CALCULATOR

Visit our Web site.
http://sharp-world.com/calculator/